

Best Practices for Responsible Disposal of Linear Tape-Open (LTO) Tape Media

*The Environmental and Economic
Benefits of Recycling vs. Destruction*

White Paper

Introduction

Linear Tape-Open (or LTO) is a magnetic tape data storage technology originally developed in the late 1990s as an open standards alternative to the proprietary magnetic tape formats that were available at the time. Seagate, Hewlett-Packard, and IBM initiated the LTO Consortium, which directs development and manages licensing and certification of media and mechanism manufacturers. LTO-5 is the most recent version and can hold 1.6 TB of data in the same size cartridge. Nearly every organization uses LTO tape for daily and weekly backups as well as long term archive storage. Even a medium size enterprise may consume hundreds of LTO tapes yearly and for the largest enterprises, usage of thousands of LTO tapes per year is very common. In managing LTO tape media, organizations are challenged with the task of disposing of tape properly when it reaches end of life. LTO tape disposal is not a trivial matter for two major reasons. First, the tape itself contains valuable company information and this information must be either erased or destroyed so that it does not fall into the wrong hands. Second, LTO tape media is not a biodegradable material and it is highly desirable to eliminate it from the solid waste stream. This white paper will examine the issues that impact LTO tape media disposal and will make recommendations for its responsible handling and disposition.

Background

Virtually every enterprise uses tape media for protecting and storing digital data. In its many shapes and sizes, magnetic tape media has served every computer from the mainframes of the early 1960's to the latest computers of the 2000's. From the 100 megabyte reel tapes of 1960's to the very latest LTO formats exceeding 1 terabyte of data per cartridge, tape has been consistently used for digital storage. All types of digital information is stored on tape including engineering data, financial data, email, and unstructured file system data and the use of tape media is growing. The cause for this increase is two fold. First of all the total amount of electronic information is growing sharply. In 2000, the University of California Berkeley completed a seminal study on the growth of digital information. The Berkeley study found that 93% of all newly created information was digital and that the amount of digital information is doubling every year. At the same time, there is increasing legal and regulatory pressure to store electronic information longer. Much of the data that tape contains is governed by federal and state regulations such as Health Insurance Portability and Accountability Act (HIPPA), Gramm-Leach-Bliley Act, Sarbanes-Oxley Act and California SB 1386. Federal and state regulations mandate that the sensitive information contained on tape be protected. This makes the disposal of tape media a serious concern to the public and private sectors. Depending on the violation, improper disposal of tape media could result in fines or other serious penalties.

End-of-Life

LTO and all tape media present a difficult challenge to virtually all organizations when times come for disposal. Many factors can contribute to the need to safely remove tape media. In most cases, the tape itself has reached its "end-of-useful-life". Each tape can be reused a finite number of times. Generally each tape can store data securely for 15 to 20 years or more. It can be loaded and unloaded over 5,000 times

and it can be written to in full passes over 250 times.¹ Of course the usage you get out of your tapes can vary based on many conditions such as hardware equipment, handling, storage and environmental cleanliness. Tape is disposed of when technology changes. LTO, for example, has had five technology refreshes in its history, each one replacing the previous version. Tapes are disposed of when companies are acquired or close their doors. No matter the reason, tape disposal is a fact of life for all tape media including LTO.

Tape Media Disposal

One difficulty with LTO tape media disposal is that the tape itself is not a biodegradable product making it a challenge to dispose of responsibly. The plastic and metal components that make up LTO are destined to become solid waste and sit in landfills for hundreds of years. The best landfills are not completely tight throughout their lifetimes and a certain amount of chemical and metal leaching will occur. There is also a risk that LTO media might end up in an illegal land fill or be incinerated, releasing toxic material into the atmosphere. Low cost bidders for media disposal, for example, may be working through brokers to send media to developing countries or to illegal waste dumps in the U.S. to reduce disposal costs, so be careful! Your tapes, and the data they contain, may cross borders and change hands many times before being destroyed. This adds risk as tapes may be lost or stolen in route.

A responsible alternative to LTO media destruction is recycling for reuse. Recycling is now the norm in companies where paper recycling and ink cartridge recycling is practiced. And for good reason: recycling helps the environment and saves money. The recycling of printer ink cartridges for reuse is now a mainstream practice where once it was considered unusual. As a responsible means of managing LTO disposal, recycling can dramatically reduce the amount of solid waste contributed to landfills.

Recycling

The most environmentally sound decision is to recycle tape for reuse. The recycling of tape media is an environmentally superior alternative to disposal. Recycling is also a cost-effective solution. The total cost to have tape removed and physically destroyed can be as much as \$2 to \$5 per tape. This fee covers the cost to securely transport tape to the service facility and perform its destruction and disposal. For recycling, the cost for tape disposal is very different because the end product can be reused and has value. The end product of tape destruction is solid waste and has no value. Disposal service providers who recycle can reduce the disposal cost by selling the end product for certified reuse. They can pass these savings to you, making recycling far more cost effective than physical destruction.

LTO Eradication Challenge

Tape erasure is a common practice with many tape formats, but LTO presents some unique challenges. LTO uses a magnetic servo bands to function and it is difficult to erase just the data without rendering the tape unusable. LTO media is laid out with 4 data bands positioned between 5 narrow servo bands. The data bands are numbered 3,1,0,2 across the tape and are filled individually, in numeric order. The head unit straddles the 2 servo bands that border the data band that is being written or read.

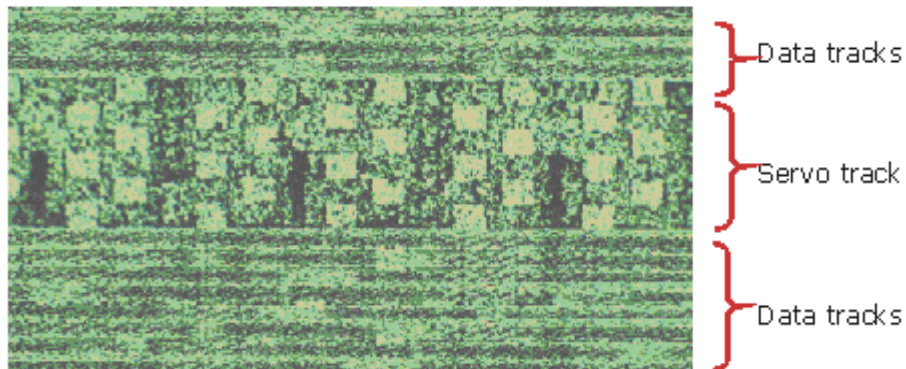
¹ http://en.wikipedia.org/wiki/Linear_Tape-Open#LTO-5

The servo bands are used to keep the head precisely aligned within the data band. The servo bands themselves are magnetic and if they are erased the LTO media is no longer functional. Due to the close proximity of the servo and data bands, data cannot be magnetically erased using bulk magnetic erase methods without also erasing the servo bands. (See figure 1.)

To “sanitize” or “eradicate” LTO media and keep the servo tracks intact, the only method available has been to re-write over the existing data. This is the preferred method when LTO media is in active use. When LTO media reaches end-of-life, the challenge is how to fully erase the tape one last time to remove the existing information? It can take hours to perform a full write pass on LTO media and for total security the official Department of Defense specifications call for three complete overwrites to cover over all residual signals. This would take over six hours per tape making it an impractical solution. And when faced with the task of erasing hundreds or thousands of LTO tapes, the total time required could be weeks or months.

Commercial vendors who claim that they can securely “sanitize” or “eradicate” LTO media face the same challenge. If they actually performed a complete, full tape write pass on each LTO tape, the total time necessary would make the project unmanageable, and unprofitable. Even if they do guarantee a full overwrite, there are write skips and inter-record gaps with any standard tape drive leaving data intact. Additionally, a standard tape drive writes at the same signal strength as the previous data covering but not eliminating it. The bottom line, some data remains. If you believe your LTO tapes are being fully erased and the secure data is completely removed, you may be mistaken. The best that most commercial vendors can do is overwrite a very short file at the beginning of the LTO tape with a new end of file (EOF) mark. The remaining 99.9% of the data remains on the tape blocked from view of standard tape drives, but accessible through available forensic procedures.

Figure 1. LTO Data Tracks and Servo Tracks



There are several servo tracks on a tape, with the data tracks between the servo tracks. An in-correctly designed erase head erases all the data tracks and the servo tracks.

LTO Erasure

We took a very close look at the problem of LTO media eradication and came up with a solution. Using proprietary new equipment we developed, we can safely, quickly and completely erase the entire length of all four data bands on all LTO media from “pin-to-hub” without damaging the performance of the tape and we are the only vendor in the industry able to make this claim. We offer this new technology as a service for LTO media eradication.

The solution that we pioneered is a breakthrough for the tape industry. It involves a new device designed specifically to erase LTO Media. (See figure 2.) The device itself is similar to a LTO drive but the internal mechanicals and electronics have been greatly modified. Key to the design is a high power, precision magnetic erase head that replaces the standard write head. This new erase head aligns perfectly to the LTO data bands retaining the existing servo bands. The device mounts the tape and streams the tape over the erase head at full streaming speed. All four data bands are 100% full-length erased from “pin-to-hub” in less than three and a half minutes.

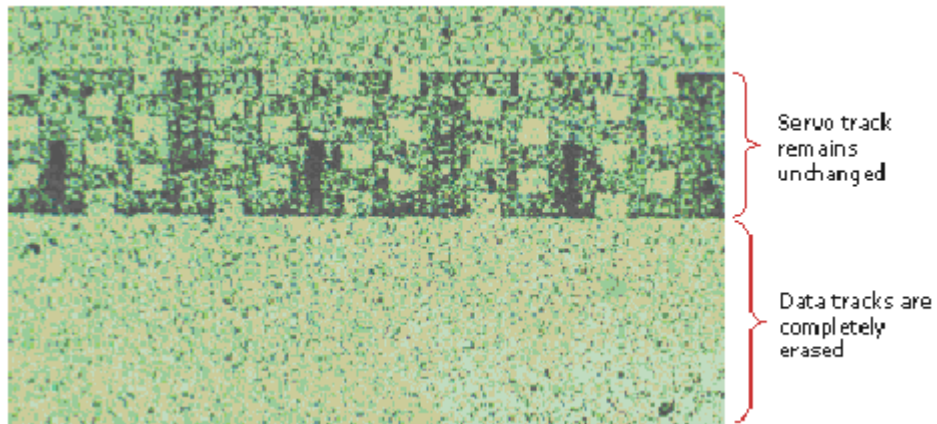
- The high power magnetic erase head applies high-energy magnetic field with full saturation at ten times the power of the standard write head. It totally penetrates through both the magnetic media coating and substrate eliminating previous signals by magnetically reorienting the entire length of the tape.
- A full length, two pass, continuous “always on” erase cycle is performed for each tape. This ensures total data elimination of the entire tape, every time with no write skips, gaps, interruptions or drive errors.
- Data destruction is 100% complete, including all address and header files. The resulting LTO tape cannot be read, on any equipment, ever period. Tapes won’t even load on a standard tape drive after the erase process.
- Every single tape is fully erased with recorded proof. Using proprietary software, each tape is tracked by date and serial number. A written confirmation and permanent records of erasure is completed and kept for every tape.



Figure 2. LTO Erase Device

The benefit of the new LTO Erase Service is security. We can now securely and thoroughly erase your LTO media avoiding the physical and environmental cost of destruction with 100% assurance and individual documentation that all data is removed. (See figure 3.) No other vendor can honestly make this claim. Even tape destruction has the risk that the tape will be lost during transport and never destroyed. Even if chain-of-custody is not a risk, no one would prefer to grind up toxic materials and incinerate them or store them in a land fill if there is an acceptable alternative.

Figure 3. LTO Erasure



LTO tape media after LTO erasure. All data tracks have been removed but the servo tracks remain.

Media Disposal Best Practices

We are your best source of information and guidance for LTO media disposal. When your tape media has reached the end of its useful life, you have several important decisions to make. To reduce the risk of losing confidential data, the easy decision may be to destroy the tape, but this carries a cost burden and it impacts the environment. The decision to recycle tape has advantages for the environment and for reduced cost, but it may carry the risk of data loss. Here are some guidelines to help you make the best decision.

First, you require approval from your organization to dispose of the tape media. Be prepared to disclose the contents of the data, its age and whether or not it contains sensitive or confidential information. When you have approval to dispose of the media, your first decision is whether to dispose of the media onsite or at an offsite facility. By disposing of tape media onsite, you can make sure that the tapes are not lost or stolen and that the disposition processes are handled 100% to your satisfaction. A reputable disposal service provider can bring in the erasing (or overwriting) equipment onsite and manage it with trained personnel. For tape media that contains highly sensitive information, this provides a means of recycling tape media vs. destruction. Tape disposed of offsite at a facility provided by the disposal service provider will require pickup at your facility. Best practice is to use secure pickup and tracking of the media by individual serial numbers to reduce the chance of improper handling and loss during transport.

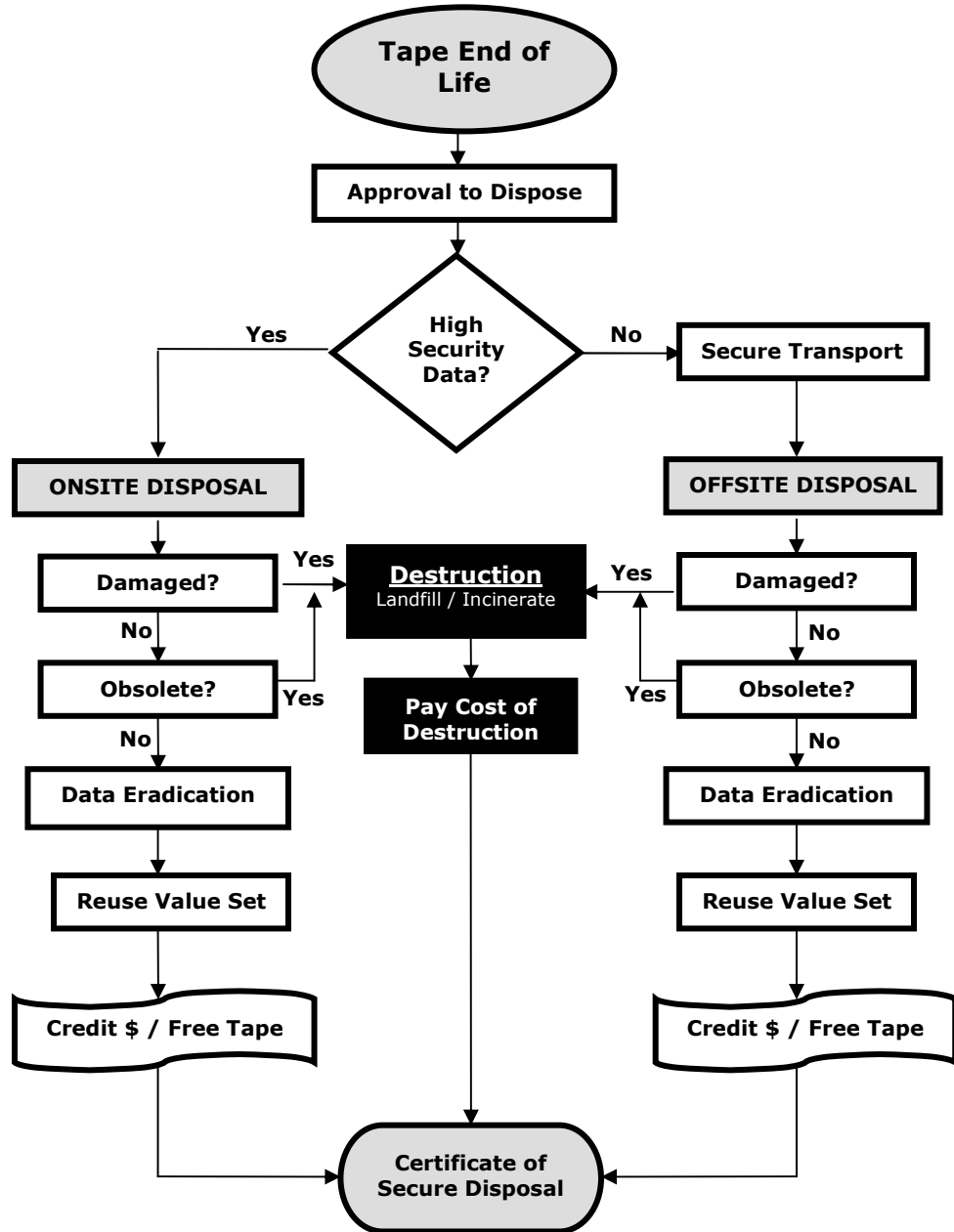


Figure Two. Tape Disposal Best Practices

Conclusion

Your company relies on LTO media to protect its digital assets and you must manage it securely throughout its entire life cycle including end-of-life. At end-of-life you have important decisions to make regarding the destruction of media or data elimination. Your decision to have tape cartridges physically destroyed may appear to offer the least risk; but it is costly, has inherent risks and negatively impacts the environment. The decision to recycle LTO media offers a much lower cost alternative, greatly reduces the impact on the environment and when done properly, offers greater data security.

We are a reputable disposal service provider who will securely remove all existing data from your LTO tape media and certify secure data eradication by providing a certificate of data destruction. We are the only source for this total erase service for LTO media. The data erase process that we use involves specialized equipment that is developed and it is managed by trained and experienced personnel.

We are the only vendor who offers a Complete LTO Erasure Service that guarantees 100% erasure of your secure information. We provide a complete service with secure handling, certificates of data destruction and chain of custody documents for every tape processed. We can ensure your data is disposed of properly allowing you to manage your tape media end-of-life in a responsible manner that balances company security, environment concerns and cost.